

May 18, 1999

Mr. Chuck Schwer Vermont ANR/DEC Waste Management Division 103 South Main St. /West Building Waterbury, VT 05671-0404

RE: Initial Investigation of Suspected Subsurface Petroleum Contamination

Bickford Libby Residence, Orleans, Vermont (VTDEC Site #98-2458)

Dear Mr. Schwer:

Enclosed please find the summary report for the site investigation conducted at the above referenced site.

Please contact me if you have any questions or comments.

Sincerely,

Christine Ward Hydrogeologist

Enclosure

c.: Mr. Bickford Libby (w/o enclosure)

c: GI#129841439

theats Want

INITIAL INVESTIGATION OF SUSPECTED SUBSURFACE PETROLEUM CONTAMINATION

BICKFORD LIBBY RESIDENCE ROUTE 5 ORLEANS, VERMONT

(VTDEC SITE #98-2458) GI #129841439

April 1999

Prepared for

Mr. Bickford Libby RD Box 62 Orleans, VT 05860

Prepared by



P.O. Box 943 Williston, Vermont 05495 (802) 865-4288

TABLE OF CONTENTS

I. INTRODUCTION
II. SITE BACKGROUND
A. SITE HISTORY
B. SITE DESCRIPTION
C. SITE GEOLOGY
III, INVESTIGATIVE PROCEDURES
A. Monitoring Well Installation
B. GROUNDWATER FLOW DIRECTION AND GRADIENT
C. GROUNDWATER SAMPLING AND ANALYSES
D. SUPPLY WELL SAMPLING
E. SENSITIVE RECEPTOR SURVEY
IV. CONCLUSIONS
17.001(0200101(0))
V. RECOMMENDATIONS
REFERENCES
APPENDICES
Appendix A - Maps
Site Location Map
Site Sketch
Groundwater Contour Map
Contaminant Distribution Map
Appendix B - Soil Logs and Monitoring Well Specifications
Appendix C - Liquid Level Monitoring Data
Appendix D - Water Quality Data
Appendix E - Analytical Laboratory Report

I. INTRODUCTION

This report summarizes the initial investigation of suspected subsurface petroleum contamination at Bickford Libby's Residence (the Site) on Route 5 in Orleans, Vermont (see Site Location Map, Appendix A). This work was requested by Mr. Chuck Schwer of the Vermont Department of Environmental Conservation (VTDEC) in a letter to Mr. Libby dated November 11, 1998. This work was performed in accordance with the November 30, 1998, Work Plan and Cost Estimate for a Subsurface Investigation of Suspected Petroleum Contamination prepared by Griffin. The work plan was approved by Mr. Schwer (VTDEC) in a letter to Mr. Libby dated January 7, 1999.

II. SITE BACKGROUND

A. Site History

On July 29, 1998, petroleum contamination was detected at the Site during soil field screening at the routine removal of one 5,000-gallon capacity diesel underground storage tank (UST). Soil samples collected during the UST closure were screened for volatile organic compounds (VOCs) using HNuTM systems Model HW-101 photoionization detector (PID) equipped with a 10.2 eV lamp. Soils collected from the excavation of the UST had VOC readings up to 150 parts per million (ppm) [2]. Bedrock was encountered at a depth of 9.5 feet in the western end of the UST excavation. A small flow of groundwater was observed on top of the bedrock in the bottom of the excavation. A heavy sheen was detected on the groundwater in the tank bed.

As a result of the petroleum contamination detected in the subsurface beneath the former UST, the VTDEC requested that additional work be conducted at the Site in order to determine the extent and degree of petroleum contamination.

B. Site Description

The Site is located on the west side of Route 5 in Orleans, Vermont. The former diesel UST was located on the north side of the Libby residence (see Site Sketch, Appendix A). According to Mr. Libby, a gasoline UST had also been located on the north side of the house, approximately between the house and the diesel UST. The gasoline UST was removed several years ago by Mr. Libby.

The ground surface topography at the Site steeply slopes down to the east toward the Barton River. The Site and surrounding area are serviced by private water supplies. The supply well for the Libby's residence is located near the northwest corner of the house, approximately 30 feet

from the former diesel UST. According to Mr. Libby the well is approximately 300 feet deep and is completed in bedrock.

C. Site Geology

According to the Surficial Geologic Map of Vermont [3], the Site is underlain by glacial till. Bedrock below the Site is mapped as the Barton River member of the Waits River formation consisting of interbedded siliceous crystalline limestone and sericite-quartz-chlorite phyllite [4].

III. INVESTIGATIVE PROCEDURES

To further define the extent of subsurface petroleum contamination in the area of the former UST, the following investigative tasks were undertaken: soil borings; monitoring well installations; determination of groundwater flow direction and gradient; groundwater sample collection and analyses for petroleum related constituents; and a sensitive receptor survey.

A. Monitoring Well Installation

Four shallow monitoring wells, MW-1 through MW-4, were installed on February 9, 1999, by Adams Engineering, under the direct supervision of a Griffin hydrogeologist. The soil borings for the monitoring wells were advanced with a truck mounted vibratory soil core sampler. The monitoring well locations are indicated on the Site Map (Appendix A).

Undisturbed soil samples were collected from the borings with the core sampler, were logged by the supervising hydrogeologist and screened for the presence of VOCs using an HNuTM systems Model HW-101 PID equipped with a 10.2 eV lamp. Prior to screening, the PID was calibrated with isobutylene referenced to benzene. Soils were screened using the Griffin Jar/Polyethylene Bag Headspace Screening Protocol which conforms to state and industry standards. Soil characteristics and contaminant concentrations were recorded by the hydrogeologist in detailed well logs which are presented in Appendix B.

Monitoring well MW-1 was installed east and in a presumed downgradient direction from the former diesel UST. Monitoring well MW-2 was installed west and in a presumed upgradient to crossgradient direction from the former diesel UST. Monitoring well MW-2 was also located in the vicinity of the former gasoline UST. Monitoring well MW-3 was installed north and in a presumed downgradient to crossgradient direction from former diesel UST. Monitoring well MW-4 was installed southeast and in a presumed downgradient direction from the former diesel UST.

Soil encountered in the four borings for the monitoring wells consisted primarily of gray-brown clay with some sand, silt, and gravel. Bedrock refusal was encountered in the borings for all four monitoring wells. During drilling, the water table was not established in each of the borings due to the dense clay soil, however approximately one-half to two feet vertical profile of soil above the bedrock was wet. No VOCs were detected with the PID at concentrations exceeding 1 ppm from the soils collected from the borings for monitoring wells MW-3 and MW-4. Elevated VOCs were detected with the PID from the water saturated soils collected from the bottom of the boring for monitoring well MW-1 and from the soils collected from the entire length of monitoring well MW-2.

Each of the new monitoring wells was constructed in a similar fashion with 1.5 inch diameter, Schedule 40 PVC, 0.010-inch, factory-slotted well screen and riser. A sand pack was installed in the annular space around the well screen from the bottom of the boring to approximately one-half to one foot above the top of the screened interval in each borehole. Above the sand pack, the annulus was filled with an approximately one foot thick bentonite clay grout seal to prevent surface water from entering the borehole. Each well was fitted with a gripper cap and secured with a water-tight road box. The road box on each well is flush-mounted, and is suitable for vehicular traffic.

B. Groundwater Flow Direction and Gradient

Water table elevation measurements were collected from the four on-site monitoring wells on February 18, 1999. The top of casing elevations were determined relative to MW-2, which was arbitrarily set at 100 feet. The depth to water in each well was subtracted from the top of casing elevation to obtain the relative water table elevation. Water level data are presented in Appendix C. No free phase product was detected in the wells on February 18, 1999. Water table elevations were plotted on the Site Sketch to generate the Groundwater Contour Map figure presented in Appendix A.

The relative water table elevations measured on February 18, 1999, suggest that groundwater flow at the Site is directed generally toward the east at a relatively steep hydraulic gradient of approximately 23%. This flow direction is toward the Barton River.

C. Groundwater Sampling and Analyses

Griffin collected groundwater samples from the three of the four on-site monitoring wells on February 18, 1999. Monitoring well MW-4 was dry on that date. The water samples were analyzed by Endyne, Inc. of Williston, Vermont, by EPA Method 8021B for the presence of benzene, toluene, ethylbenzene, and xylenes (BTEX), methyl tertiary butyl ether (MTBE), naphthalene, and the alkylbenzenes: 1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene, and for total petroleum hydrocarbons (TPH) by EPA Method 8015-DRO (diesel range organics).

Results of the laboratory analyses for the monitoring wells are summarized in Appendix D. The laboratory analysis report is contained in Appendix E. Analytical results of the trip blank and duplicate samples indicate that adequate quality assurance and control were maintained during sample collection and analysis.

Benzene, toluene, ethylbenzene, 1,3,5-trimethylbenzene, 1,2,4-trimethylbenzene, and naphthalene were detected in the groundwater samples collected from MW-1 and MW-2 in concentrations exceeding the Vermont Groundwater Enforcement Standards (VGES) for these compounds. A concentration of xylenes, below the VGES, was also detected in the samples from MW-1 and MW-2.

The groundwater sample collected from crossgradient monitoring well MW-3 had no detectable levels of the petroleum compounds targeted by the analysis.

D. Supply Well Sampling

Griffin collected a water sample from the Libby's supply well on February 18, 1999. The supply well sample was collected from the kitchen faucet. Water was purged from the piping system prior to sample collection.

The supply well water sample was analyzed by EPA Method 8021B and by EPA Method 8015-DRO. The laboratory analysis report is contained in Appendix E. No targeted petroleum compounds were detected by laboratory analysis in the water sample collected from the supply well. No unidentified peaks (UIPs) were detected in the supply well water sample.

E. Sensitive Receptor Survey

A qualitative risk assessment was conducted to identify known and potential receptors of the limited contamination detected at the Site. A visual survey was conducted during the monitoring well installation on February 9, 1999. Based on these observations, a determination of the potential risk to identified receptors was made.

The soil and groundwater in the vicinity of the former USTs are potential receptors of the UST-related contamination.

The Libby residence has a basement which is of stone and mortar wall construction with a dirt floor. The indoor air of the Libby's basement was screened for the presence of VOCs with the PID on February 9, 1999. No VOCs were detected above background. The risk to the indoor air posed by the petroleum impact in the vicinity of former USTs is considered minimal based on the non-detection of VOCs in the basement with the PID and the eastward groundwater flow direction away from the house.

The entire area is served by private water supplies. The Libby's supply well is located approximately 30 feet from the former diesel UST and approximately 20 feet from the reported former gasoline UST. The supply well is reportedly approximately 300 feet deep and completed in bedrock. A water sample was collected from this supply well for laboratory analysis; no targeted VOCs were detected. There is currently no evidence to suggest that the supply well has been impacted by the detected subsurface petroleum contamination in the vicinity of the former USTs. However, given the close proximity of the supply well to the former USTs, the potential risk for petroleum impact to the supply well in the future can not be discounted.

There are approximately three water supply wells within a 0.5 mile radius of the Site; none are in an estimated downgradient direction from the UST pit with respect to the surficial aquifer. The risk to these other potential supply wells is considered minimal based on their location with respect to the estimated shallow groundwater flow direction and given the sufficient distance between these supply wells and the Site.

The nearest surface water is the Barton River, located approximately 1,000 feet east of the former UST location. The risk to the Barton River is considered minimal given the sufficient distance between the Site and the river.

IV. CONCLUSIONS

Based on the results of this initial site investigation at the Bickford Libby Residence, Griffin presents the following conclusions:

- There was a release(s) of petroleum to the subsurface in the vicinity of the former diesel UST and the former gasoline UST at the Site. The source of the detected petroleum contamination is likely due to spills, overfills, and leaks due to usage over time. The duration and volume of product released is unknown. The diesel UST was removed in September of 1998. The gasoline UST was removed several years prior.
- VOC readings of soils collected during the diesel UST closure in September 1998 indicate that adsorbed petroleum compounds existed in the soils in the immediate vicinity of the former USTs. With the source USTs eliminated it is expected that residual adsorbed petroleum compound concentrations will decrease over time with the progressive action of natural mitigative processes including biodegradation, volatilization, and diffusion.
- Four groundwater monitoring wells, MW-1 through MW-4, were installed by Griffin at the Site on February 9, 1999. VOCs were not detected by field screening methods in the soil samples collected from the borings for monitoring wells MW-3 and MW-4. Elevated VOCs were detected with the PID from the water saturated soils collected from the

bottom of the boring for monitoring well MW-1 and from the soils collected from the entire length of monitoring well MW-2.

- 4) Bedrock refusal was encountered in the soil borings for the four monitoring wells at depths ranging from 8.4 to 11.6 feet below the ground surface.
- 5) The shallow groundwater flow beneath the Site on February 18, 1999, was directed generally to the east, toward the Barton River, at a relatively steep hydraulic gradient of approximately 23%.
- Groundwater samples were collected from the four site monitoring wells on February 18, 1999. Concentrations of select petroleum compounds detected in the groundwater samples exceeded their respective VGES. With the USTs replaced, it is expected that dissolved petroleum compound concentrations will decease over time with the progressive action of natural mitigative processes, including dilution, dispersion, and biodegradation.
- 7) The Site and the surrounding area are served by private water supplies. A groundwater sample was collected from the Libby's supply well and analyzed for petroleum compounds by EPA Method 8021B and EPA Method 8015-DRO. No targeted petroleum compounds and no unidentified peaks of petroleum compounds were detected by laboratory analysis in the supply well sample.
- 8) Other than site soils and groundwater in the direct vicinity of the former diesel UST and the reported former gasoline UST, there are no sensitive receptors currently known to be affected by the subsurface petroleum contamination at the Site.

V. RECOMMENDATIONS

Based on the results of this site investigation, Griffin recommends the following:

- Since select petroleum compounds were detected in the groundwater at concentrations
 exceeding their respective VGES, a confirmatory round of groundwater elevations and
 samples should be collected from the four site related monitoring wells during the Spring of
 1999. The groundwater samples should be analyzed for petroleum compounds by EPA
 Method 8021B. The frequency of future sampling will be reassessed following the next
 sampling event.
- 2. During the next sampling event, a water sample should also be collected from the supply well and analyzed for drinking water VOCs according to EPA Method 524.2 since this method has slightly lower detection limits than EPA Method 8021B and conforms to Vermont Department of Health (VT DOH) standards.

REFERENCES

- 1. USGS 7.5 Minute Topographic Map, Orleans, VT, dated 1986.
- 2. Griffin International, August 13, 1998, Bickford Libby UST Closure Inspection, letter report to Ms. Sue Thayer, Vermont ANR/DEC, Waste Management Division.
- 3. Doll, Charles G., ed., 1970, Surficial Geologic Map of Vermont, Vermont Geological Survey.
- 4. Doll, Charles G., ed., 1961, Centennial Geologic Map of Vermont, Vermont Geological Survey.

APPENDIX A

Site Location Map Site Sketch Groundwater Contour Map Contaminant Distribution Map



SOURCE: USGS- BURLINGTON, VERMONT QUADRANGLE



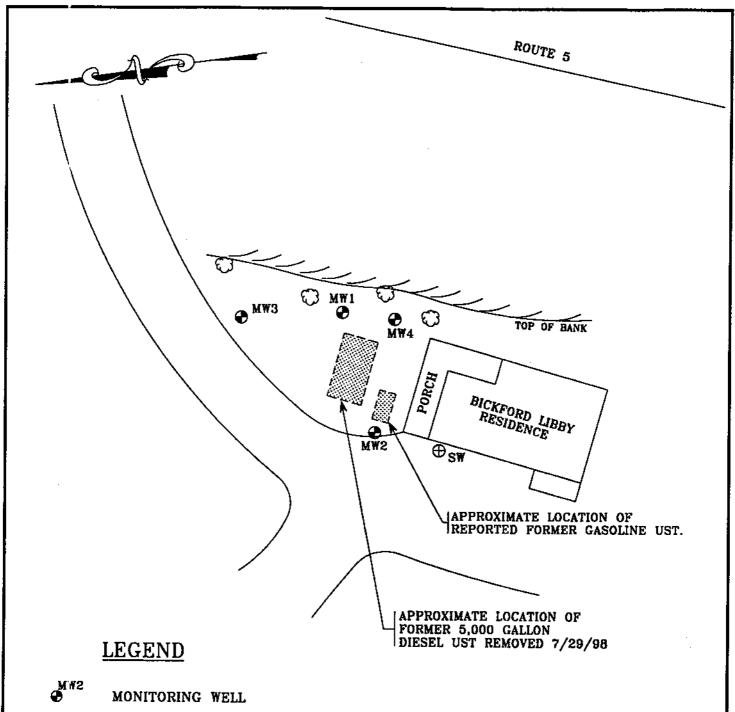
BICKFORD LIBBY RESIDENCE

ROUTE 5, ORLEANS, VERMONT

SITE LOCATION MAP

DATE: 2/15/99 DWG.#:1

SCALE: 1:24000 DRN.:SB APP.:CW



SVI

SUPPLY WELL

TREE

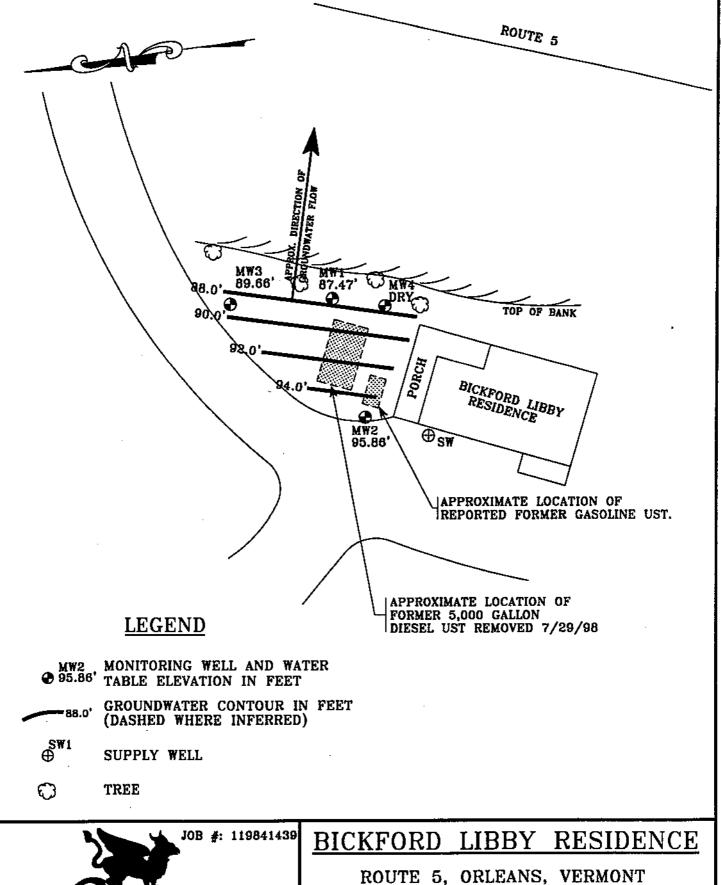


BICKFORD LIBBY RESIDENCE

ROUTE 5, ORLEANS, VERMONT

SITE SKETCH

DATE: 2/15/99 DWG.#:2 SCALE: 1"=30' DRN.:SB APP.:CW



GROUNDWATER CONTOUR MAP MEASUREMENT DATE: 2/18/99

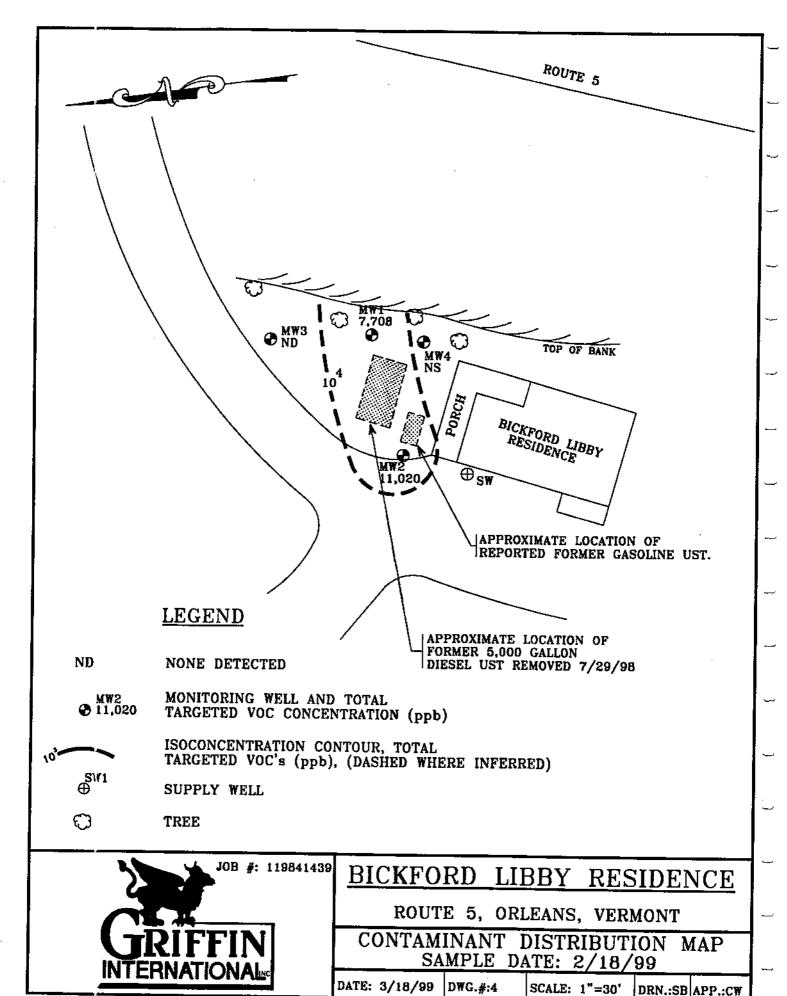
SCALE: 1"=30'

DRN.:SB APP.:CW

DWG.#:3

DATE: 3/18/99





Dittilled All Lieu

APPENDIX B

Soil Logs and Monitoring Well Specifications

PROJECT BICKFORD LIBBY RESIDENCE

OCATION ORLEANS, VERMONT

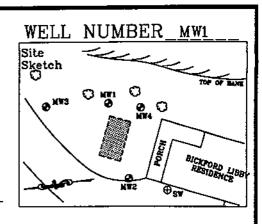
DATE DRILLED 2/9/99 TOTAL DEPTH OF HOLE 11.6'
DIAMETER 2.75"

SCREEN DIA. 1.5" LENGTH 9.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 2.4' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

RILLER GERRY ADAMS LOG BY C. WARD



[]	RILLE	ER <u>GERRY ADA</u>	AMS LOG BY	C. WARD	GRIFFIN INTERNATIONAL	L, INC
	DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
	- 0 2 3 10 13 15 16 17 18 21 22 25 - 25			0'-1' 0.2 ppm 1'-4.1' 0 ppm 4.1'-7.1' 0.8 ppm 7.1'-9.1' 240 ppm 9.1'-11' 190 ppm 11'-11.6' 190 ppm	SANDY SILT (ML)- 50% silt, 50% fine sand, moist, brown. FAT CLAY (CH)- 95% clay, 5% fine gravel, moist, gray/brown. LEAN CLAY (CL)- 95% clay, 5% fine gravel, moist, gray/brown. SANDY LEAN CLAY (CL)- 85% clay, 10% fine sand, 5% fine gravel, moist, gray/brown. 9.0' WATER TABLE FAT CLAY WITH SAND (CH)- 80% clay, 10% sand, 10% fine gravel, wet, gray/brown. SILT WITH SAND (ML)- 80% silt, 20% fine sand, wet, black. BASE OF WELL AT 11.6' BEDROCK REFUSAL AT 11.6'	- 0 - - 1 - - 2 - - 3 - - 4 - - 5 - - 6 -
	لـــــا		<u> </u>			

PROJECT BICKFORD LIBBY RESIDENCE LOCATION ORLEANS, VERMONT DATE DRILLED 2/9/99 TOTAL DEPTH OF HOLE 9.1' DIAMETER 2.75" SCREEN DIA. 1.5" LENGTH 6.5' SLOT SIZE 0.010" CASING DIA. 1.5" LENGTH 2.3' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

WELL NUMBER MW2 Site Sketch

DRILI	ER GERRY AD	AMS_LOG_BY_	C. WARD	GRIFFIN INTERNATIONAL, IN	C
DEPT IN FEE	CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION IN FEET	•
- 0 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 - 12 - 13 - 14 - 15 - 16 - 17 - 18 - 19 - 20 - 21 - 22 - 23 - 24 - 25		ROAD BOX LOCKING WELL CAP	4.6'-8.5' 200 ppm 8.5'-8.8' 110 ppm 8.8'-9.1' 150 ppm	SANDY SILT (ML)— 50% silt, 25% fine sand, 25% fine gravel, dry to moist, brown. SILTY SAND WITH GRAVEL (SM)— 35% silt, 40% fine sand, 25% fine gravel, dry to moist, dark gray. FAT CLAY WITH SAND (CH)— 85% clay, 10% sand, 5% gravel, moist, light gray/brown. FAT CLAY (CH)— 90% clay, 10% gravel, moist to wet, gray/brown mottled.	

PROJECT BICKFORD LIBBY RESIDENCE

OCATION ORLEANS, VERMONT

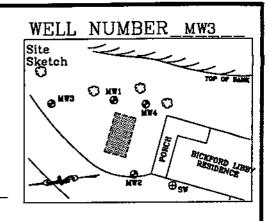
DATE DRILLED 2/9/99 TOTAL DEPTH OF HOLE 10.3'

NAMETER 2.75"

SCREEN DIA. 1.5" LENGTH 7.5' SLOT SIZE 0.010"

ASING DIA 1.5" LENGTH 2.5' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY



∩RILLI	ER GERRY ADA	AMS LOG BY	C. WARD	GRIFFIN INTERNATIONA	L, INC
— DEPTH IN FEET	WELL CONSTRUCTION	NOTES	BLOWS PER 6" OF SPOON & PID READINGS	DESCRIPTION/SOIL CLASSIFICATION (COLOR, TEXTURE, STRUCTURES)	DEPTH IN FEET
- 0 - - 1 - - 2 - - 3 -		ROAD BOX LOCKING WELL CAP CONCRETE BENTONITE WELL RISER	0'-1.5' 0 ppm 1.5'-4.4' 0 ppm	SILTY SAND WITH GRAVEL (SM)- 30% silt, 50% fine sand, 20% fine gravel, dry, brown. FAT CLAY (CH)- 90% clay, 10% gravel, dry to moist, light gray/brown.	- 3 -
- 4 - - 5 - - 6 -		SAND PACK	4,4'-9.4'	FAT CLAY (CH) - 95% clay, 5% fine gravel, moist, light gray/brown.	- 4 - - 5 - - 6 -
- 7 - - 8 - - 9 -		WELL SCREEN BOTTOM CAP	0 ppm	9.0' WATER TABLE No Recovery.	8-
-10 - -11 - -12 -		UNDISTURBED NATIVE SOIL		BASE OF WELL AT 10.3' BEDROCK REFUSAL AT 10.3'	-10 - -11 - -12 -
-13 - -14 - -15 -					-13 - -14 - -15 -
-16 - -17 - -18 -					-16 - -17 - -18 -
-19 - -20 - -21 -					-19 - -20 - -21 -
-22- -23-					-22- -23- -24-
24- 25-		<u>.</u>			-25-

PROJECT BICKFORD LIBBY RESIDENCE

LOCATION ORLEANS, VERMONT

DATE DRILLED 2/9/99 TOTAL DEPTH OF HOLE 8.4'

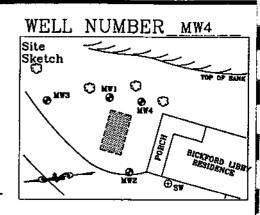
DIAMETER 2.75"

SCREEN DIA. 1.5" LENGTH 6.0' SLOT SIZE 0.010"

CASING DIA. 1.5" LENGTH 2.2' TYPE sch 40 pvc

DRILLING CO. ADAMS ENGR. DRILLING METHOD VIBRATORY

DRILLER GERRY ADAMS LOG BY C. WARD



DEPTH NOTES BLOWS PER 6" OF SPOON & PID READINGS CLASSIFICATION DEPTH IN FEET	DRILLER GERRY AD	AMS_LOG BY_	C. WARD	GRIFFIN	INTERNATIONAL	L, INC
LOCKING WELL CAP CONCRETE	IN CONSTRUCTION	NOTES	6" OF SPOON	DESCRIPTION/ (COLOR, TEXT	SOIL CLASSIFICATION TURE, STRUCTURES)	1 447 1
	- 1 - 2 - 3 - 4 5 6 7 8 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 24	LOCKING WELL CAP CONCRETE BENTONITE WELL RISER SAND PACK WELL SCREEN BOTTOM CAP UNDISTURBED	0.8 ppm 4.4'-8.0' 0 ppm 8.0'-8.4'	sand, 10% fine gr brown. FAT CLAY (CH)- 9: moist, gray/brown 8.0' WATER WEATHERED BEDRO BASE OF WE	TABLE CK- wet, black.	- 1 2

APPENDIX C

Liquid Level Monitoring Data

LIQUID LEVEL MONITORING DATA

BICKFORD LIBBY RESIDENCE ROUTE 5 ORLEANS, VERMONT

2/18/99

		Top of	Depth To	Depth To		Specific		Corrected	Corrected
Well I.D.	Well Depth	Casing	Product Water Produc		Product	Gravity	Water	Depth	Water Table
	bgs	Elevation	btoc	btoc	Thickness	Of Product	Equivalent	To Water	Elevation
MW-1	11.6	96.87		9.40	-	-	-	-	87.47
MW-2	9.1	100.00	-	4.14	-		-	-	95.86
MW-3	10.3	95.91	-	6.25	-	-	-	-	89.66
MW-4	8.4	97.37	_	dry	-	-	-	-	-

All Values Reported in Feet

btoc - Below Top of Casing

bgs - Below Ground Surface

Elevations determined relative to top of casing of MW-2, which was arbitrarily set at 100'

Top of Casing Elevations surveyed by Griffin on 2/9/99

APPENDIX D

Water Quality Data

WATER QUALITY DATA

BICKFORD LIBBY RESIDENCE ROUTE 5 ORLEANS, VERMONT

Sample Location	MW-1	MW-2	MW-3	MW-4	Supply Well	VGES
Sample Date:	2/18/99	2/18/99	2/18/99	2/18/99	2/18/99	
Analytical Method:	8021B	8021B	8021B	8021B	8021B	
PARAMETER						(ppb)
Benzene	366.	1,100.	ND>1		ND>1	5.
Toluene	1,180.	2,400.	ND>1	No Sample	ND>1	1,000.
Ethylbenzene	711:	811.	ND>1	Collected	ND>1	700.
Xylenes	2,540.	3,260.	ND>1	Well Dry	ND>1	10,000.
Total BTEX	4,797.	7,571.	ND		ND	-
MTBE	ND>1,000	ND>500	ND>10		ND>10	40.
1,3,5-Trimethylbenzene	732.	867.	ND>1		ND>1	4.
1,2,4-Trimethylbenzene	1,980.	2,270.	ND>1		ND>1	5.
Naphthalene	199.	312.	ND>1		ND>1	20.
Total Targeted VOCs	7,708.	11,020.	ND.		ND	-

		8015-DRO	8015-DRO	8015-DRO	8015-DRO	
TPH (mg/L)	150	466	0.62		ND>0.40	

All Values Reported in ug/L (ppb), except TPH which is reported in mg/L (ppm)

ND>1 - None Detected above Detection Limit

TBQ<1 - Trace Below Quantitation Limit

Detections are bolded.

Blank cell - not analyzed

VGES - Vermont Groundwater Enforcement Standard

>VGES

APPENDIX E

Analytical Laboratory Report



32 James Brown Drive Williston, Vermont 05495 (802) 879-4333 FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International

PROJECT NAME: Bickford Libby Res

REPORT DATE: February 24, 1999 DATE SAMPLED: February 18, 1999 **ORDER IS: 1409**

REF.#: 134,916 - 134,932

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D. Laboratory Director

enclosures



32 James Brown Drive Williston, Vermont 05495 (802) 879-4333 FAX 879-7103

EPA METHOD 8021B--PURGEABLE AROMATICS

CLIENT: Griffin International

DATE RECEIVED: February 19, 1999

PROJECT NAME: Bickford Libby Res

REPORT DATE: February 24, 1999

CLIENT PROJ. #: 129841439

ORDER IS: 1409

Ref. #:	134,916	134,917	134,929	134,930	134,931
Site:	Trip Blank	MW #1	MW #2	Dup MW 2	MW3
Date Sampled:	2/18/99	2/18/99	2/18/99	2/18/99	2/18/99
Time Sampled:	6:33	11:07	10:48	10:48	11:18
Sampler:	Steve	Steve	Steve	Steve	Steve
Date Analyzed:	2/22/99	2/22/99	2/23/99	2/23/99	2/23/99
UIP Count:	0	>10	>10	>10	8
Dil. Factor (%):	100	1	2	2	100
Surr % Rec. (%):	92	89	81	84	93
Parameter	1 Cong (ug/L)	Cone (ua/l)	Come (nell)	Come (well)	Cono (uo/
ratameter	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)	Conc. (ug/L)
MTBE	<10	<1000	<500	<500	<10
					
MTBE	<10	<1000	<500	<500	< 10
MTBE Benzene	<10 <1	<1000 366.	<500 1,100.	<500 946.	<10 <1
MTBE Benzene Toluene	<10 <1 <1	<1000 366. 1,180.	<500 1,100. 2,400.	<500 946. 2,150.	<10 <1 <1
MTBE Benzene Toluene Ethylbenzene	<10 <1 <1 <1	<1000 366. 1,180. 711.	<500 1,100. 2,400. 811.	<500 946. 2,150. 754.	<10 <1 <1 <1
MTBE Benzene Toluene Ethylbenzene Xylenes	<10 <1 <1 <1 <1 <1	<1000 366. 1,180. 711. 2,540.	<500 1,100. 2,400. 811. 3,260.	<500 946. 2,150. 754. 3,050.	<10 <1 <1 <1 <1

802\016F0118

	· · · · · · · · · · · · · · · · · · ·				
Ref. #:	134,932				
Site:	Supply Well				
Date Sampled:	2/18/99				·
Time Sampled:	10:24				
Sampler:	Steve				
Date Analyzed:	2/22/99		1		
UIP Count:	0		1]
Dil. Factor (%):	100				
Surr % Rec. (%):	95		<u> </u>		
Parameter	Conc. (ug/L)				<u> </u>
MTBE	<10				
Benzene	<1				
Toluene	<1		ŀ		:
Ethylbenzene	<1				
Xylenes	<1				1
1,3,5 Trimethyl Benzene	<1		1	ļ	
1,2,4 Trimethyl Benzene	<1	1]	

Note: UIP = Unidentified Peaks TBQ = Trace Below Quantitation NI = Not Indicated



32 James Brown Drive Williston, Vermont 05495 (802) 879-4333 FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International

national ORDER ID: 1409

PROJECT: Bickford Libby Res REPORT DATE: March 5, 1999 DATE RECEIVED: February 19, 1999

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Different groups of analyses may be reported under separate cover.

All samples were prepared and analyzed by requirements outlined in the referenced methods and within the specified holding times.

All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced methods.

Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits, unless otherwise noted.

Reviewed by,

Harry D. Locker, Ph.D. Laboratory Director

enclosures



32 James Brown Drive Williston, Vermont 05495 (802) 879-4333 FAX 879-7103

LABORATORY REPORT

CLIENT: Griffin International

PROJECT: Bickford Libby Res

REPORT DATE: March 5, 1999

ORDER ID: 1409

DATE RECEIVED: February 19, 1999

SAMPLER: Steve

ANALYST: 820

			•					
Ref. Number: 134917	Site: MW #1		Date Sampled: February 18, 1999 Time: 11:07 PM					
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	Analysis Date				
TPH 8015 DRO	150.	mg/L	SW 8015B	3/1/99				
Ref. Number: 134929	Site: MW #2		Date Sampled: February	18, 1999 Time: 10:48 PM				
<u>Parameter</u>	Result	<u>Unit</u>	<u>Method</u>	Analysis Date				
TPH 8015 DRO	466.	mg/L	SW 8015B	3/1/99				
Ref. Number: 134931	Site: MW 3		Date Sampled: February	18, 1999 Time: 11:18 PM				
<u>Parameter</u>	<u>Result</u>	<u>Unit</u>	<u>Method</u>	Analysis Date				
TPH 8015 DRO	0.62	mg/L	SW 8015B	2/26/99				
Ref. Number: 134932	Site: Supply Well		Date Sampled: February	18, 1999 Time: 10:24 AM				
<u>Parameter</u>	Result	<u>Unit</u>	<u>Method</u>	Analysis Date				
TPH 8015 DRO	< 0.40	mg/L	SW 8015B	2/26/99				

32 James Brown Drive Williston, Vermont 05495 (802) 879-4333

100																
	me: Birt Fores		RES	Re	Reporting Address: FO Box 943					Billing Address:						
Site Location	on: Opleans,	1/4 _		19	رص	مبرو	te war	W	1/1	iistori	5 YE	8	me LS Ro	्रक कर्ट	<u>.</u>	
Endyne Pro	oject Number:	1111	0	Co	Company: GRIFT (1) International Sampler Name: True											
<u> </u>		140	`1	Co	Contact Name/Phone #: Chairs Wheep Phone #: (202) 865-4288											
				T T	G	C		Sam	ple (Containers				Analysis	Sample	
Lab#	Sample I	ocation	M	atrix	R A	O M	2/18/9°			Type/Size	Ĭ-	iield Res	adts/Remarks	Required		Rush
12 49.1	TRIP Bla	.T.			<u>"</u>	P	6:33		-	tom!				(A) (2 15		
13-1916	1 %	NC		<u>رح</u>	$\overline{}$	<u> </u>	6 100	+						<u> </u>	B HS	
134917	MWI				-			13		\			からののかく			
134929								3	2 _		<u>S</u>	टळार्	O15CE4M			
134930	DUD WI	<u> </u>						2						30215	3	
134931	MW3							7			·		\$10	0,1		
134930	Supply	<u> </u>	_					3	_ _		810	PMC	~ E11508 ~		17	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				$\overline{}$				+	-/-			- 			
				$\overline{}$	-{				+	- (
				4	-) -			-	+-					ļ	-+ ` +	
									-							
<u> </u>					-											
									- -		·					
									<u> </u>							
Relinquished	by: Signature	F	albo	Rea	cived b	y: Signa	ture / 1:100	- i) 6	100	h	/Date/	fune 2 - 19	-00	10 16	
		\$2000 x	<u> </u>											···	10.50	·
Relinquished		A	asvel	19 JRc	ceived b	y: Signa	ture a.C.	2000	<u> </u>	Hora	(00)	Date/	Time > /9	-99	1015	
New York Sta	de Project: Yes	No					Requested									
llq t		6 TKN		<u> </u>	1 T	otal Solid	s	16	Ме	etals (Specify)		21	EPA 624	26	EPA 8270 B/N or Ac	id
2 Chie	onde	7 Total F		1	2 1	SS		17	Co	difonn (Specif	(y)	22	EPA 625 BAN of A	27	EPA 8010/8020	
3 Am	monia N	8 Total I	Diss. P	1	3 T	DS		1.8	CC	212		23	EPA 418 1	28	EPA 8080 Pest/PCB	
4 Nar	rite N	9 BOD,]	4 7	urbidny		19	13,1	TEX.		24	EPA 608 Post3N/B			
5 Nitu	rate N	10 Alkalii	nity	1	5 C	onductiv	ity	20	EF	A 601/602		25	EPA 8240			
29 TC1	.P (Specify: volatiles, semi-vo	latiles, metals, p	pesticides, herbici	ides)												
30 Oth	er (Specify)															